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CONTENTS

PAGE

THE GEOGRAPHICAL DISTRIBUTION OF INSANITY IN THE UNITED STATES. BY DR WILLIAM A. WHITE, SUPERINTENDENT GOVERNMENT HOSPITAL FOR THE INSANE, WASHINGTON, D. C. 361

PEARY AND THE NORTH POLE 379

THE INFLUENCE OF FORESTRY UPON THE LUMBER INDUSTRY OF THE UNITED STATES. BY OVERTON W. PRICE, ASSISTANT FORESTER, BUREAU OF FORESTRY 381

GUILLEMOT EGGS 386

SKULL OF THE IMPERIAL MAMMOTH 388

EIGHTH ANNUAL GEOGRAPHIC CONGRESS 388

PHILIPPINE CENSUS 390

CORRECTION 390

DIRECTORY OF OFFICERS AND COUNCILLORS OF GEOGRAPHIC SOCIETIES OF THE UNITED STATES 392

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WASHINGTON, D. C.

VOL. XIV, No. 10 WASHINGTON OCTOBER, 1903

THE NATIONAL GEOGRAPHIC MAGAZINE

THE GEOGRAPHICAL DISTRIBUTION OF INSANITY IN THE UNITED STATES*

BY DR WILLIAM A. WHITE,

SUPERINTENDENT GOVERNMENT HOSPITAL FOR THE INSANE, WASHINGTON, D. C.

WHEN I was invited by the National Geographic Society to address the Society on the geographical distribution of insanity in the United States, my ideas on the subject were extremely chaotic. I had vague notions of the possibility of formulating laws that would express the relationship between insanity and latitude and longitude, temperature, precipitation, &c., and I felt that a diligent study of statistics would be rewarded by the emergence of such laws. Similar ideas, I think, would quite naturally occur to any scientific man not especially acquainted with the statistical study of sociological phenomena. Confronted at the outset by the fact that the proportion of insanity varies greatly in different regions of the United States, what more natural than to ascribe such variations directly to the difference in man's physical environment in these localities?

From time immemorial variations in climate and in weather conditions have been supposed to produce profound effects upon man's conduct, and such expressions as the "depressing effects of heat" and the "stimulating effects of cold" are common in our every-day conversation, and I believe that all of us have a more or less clearly defined idea that the physical and mental characteristics of the different races of men are to some extent an expression of the effects of the climatic and geographic conditions under which they live. This general conception was particularly fathered by that great English historian, Henry Thomas Buckle, who, in the opening chapters of his "History of Civilization in England" traces in detail the effects of the four great physical factors—climate, food, soil, and the general aspect of nature—upon the characters of individuals and upon the growth of races and the progress of civilization.

There has consequently been fostered

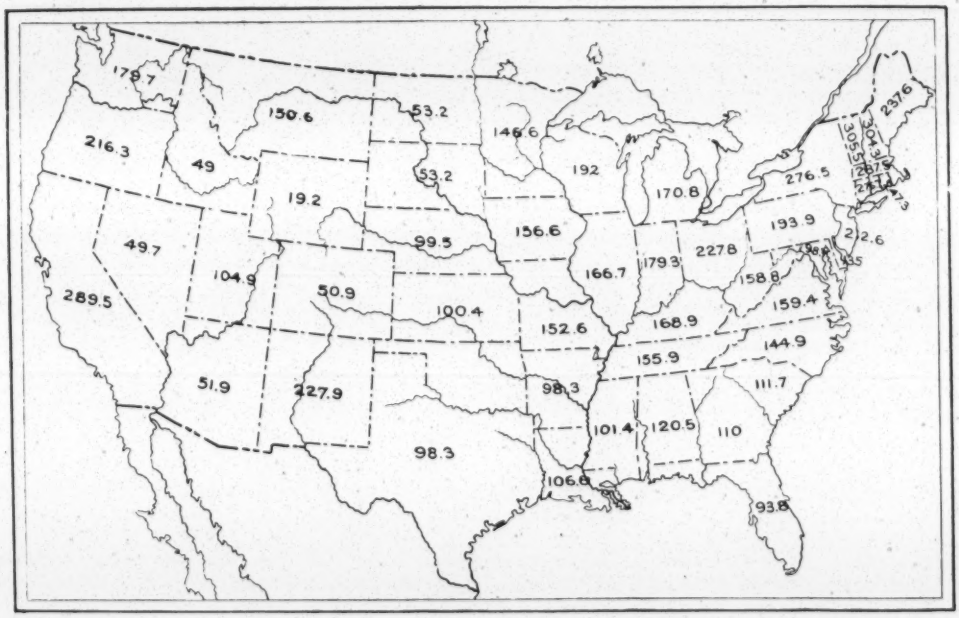
* Read before the National Geographic Society, Washington, D. C., February 6, 1903.

a general tendency on the part of statisticians and those engaged in the study of abnormal mental conditions, to follow along these lines with a view to establishing relations of cause and effect.

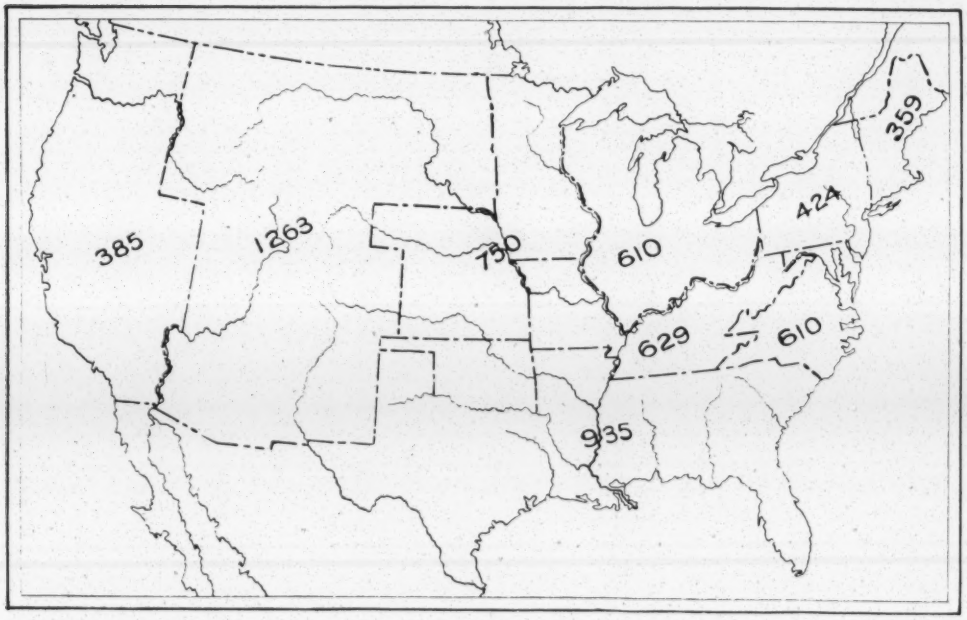
If I am not able to present to you such laws as I originally dreamt of, clothed in all the beauty of mathematical formulæ and demonstrating beyond doubt the precise effects of each climatic and geographic factor upon the prevalence of mental disease, I at least hope to be able to show why it is not possible to do so, and I feel assured that my results may be just as valuable as if it were.

The social organism is extremely complex, and any effort to reason from the association of two or more conditions to the probable causative relations between them is always dangerous, and when figures are suborned for such purposes the results are notoriously inaccurate. With the elaborate means used of late years by the governments of all civilized nations for the collection of statistics, it is but natural that the figures obtained should be applied to all sorts of social conditions, and thus we are treated by the authorities to elaborate tables which show the month, day, and hour when suicide is most prevalent in a certain country, the season of the year in which crimes of violence reach their maximum, the effects of temperature, barometric pressure, humidity, wind velocity, and precipitation upon various phases of conduct, such as attendance at school, infractions of discipline in prisons, clerical errors in banks, &c., &c.

In view of all these facts, it is my function tonight to inquire whether the prevalence of insanity in the various regions of the United States can be shown to have any definite relation to any one or more of these environmental conditions; whether insanity is more prevalent at certain elevations above sea-level or between certain degrees of latitude; whether it prevails more especially in regions of a certain average



Outline Map No. I.—Ratio of Total Insane per 100,000 Population, Census 1880



Outline Map No. II.—Number Population for Each Insane Person, Census 1880

temperature and barometric pressure, or, on the other hand, where the mean humidity is high or low, and, further, if these conditions can not be shown to have a causative effect upon its distribution, what has?

Let us start our inquiry by a study of a map of the United States upon each state and territory of which the ratio of insane to 100,000 population is indicated, in accordance with the census returns for 1880 (see outline maps Nos. I and II). We are at once confronted with a condition of affairs which is so well marked that when I first saw it I was very much surprised. The greatest proportion of insanity is in the Northeast—in the New England and Middle States—of which New Hampshire, Vermont, Massachusetts, Connecticut, and New York all have one insane person to less than 400 of the population. If from this center of greatest prevalence of insanity we draw a line in any direction—West, South, or Southwest—we see that no matter which way we go we find a steady decrease until we strike the Pacific slope. A slight interruption of the continuity of the decrease is noted in Michigan as we go west, but is, I think, of little consequence. As we go south along the coast Delaware appears as a marked exception. This is due to the fact that previous to the organization of the Delaware state hospital in 1889 no statistics of insanity were reliable. The insane were county charges and the care given them was so atrociously bad that every one took pains to conceal cases occurring in their families. Despite these minor variations the decrease of insanity as we go from the northeastern part of the United States—South, West, or Southwest—must strike you as being remarkably uniform and constant. This uniform decrease only takes place if we start from this northeastern center. If,

for instance, we drop a line from any of the Northwestern States, as Idaho, Montana, or Minnesota, we find no uniform results, and if we go South from the Dakotas we will find that the proportion of the insane actually increases. The notable increase when we strike the Pacific slope I will speak of later.

If we now attempt to explain this condition of affairs by the topographical or the climatic conditions we are at once met by insuperable difficulties. If variation in temperature is alone responsible, why does not the proportion of insane diminish as we go south from the Dakotas as well as from the New England States? Or, on the other hand, why should Maine have a smaller proportion of insane than any other New England State? Montana, which is as far north as Maine, has a higher ratio than the states immediately south of it. If meteorological conditions are determining factors, why do we not find a marked variation in the proportion of the insane in the states bordering on the Great Lakes? Here we have conditions quite different from anywhere else in the United States. This region, a large area of which is occupied by these immense island seas, is directly in the course of the greater proportion of storms which come from the Northwest and pass through here on their way to the Atlantic coast; sudden variations in temperature, barometric pressure, and wind velocity are the rule, and with the immense areas of evaporation, fogs and rains are frequent and the percentage of cloudiness unusually high (66 per cent), still there is nothing in the proportion of the insane to call our special attention to this region.

I might continue in this wise, but it is only necessary for me to call your attention to the general results of such reasoning. They are these. The variation in the proportion of insanity in the different states is regular and uniform, while both geographic and climatic conditions are not, but, on the contrary, differ greatly in different parts of the United States, as, for instance, in the region of the Great Lakes just mentioned. If, therefore, we would explan these figures, we must seek a cause as uniform as its effects. This cause, or, more properly, these causes, are the same causes that make for civilization, the same that make for permanency and organization of social institutions, the same that make for concentration of population in great cities, the same, in short, that make for progress in its broadest sense.

Before proceeding to the elucidation of this proposition, let us for a moment return to the consideration of some first principles.

I did not intend to convey the idea by the remarks I just made about the influence of climate on conduct that no such influence could be demonstrated. On the contrary, I think it can be, and in fact has been. Dexter* has recently shown this in a most admirable and exhaustive study of the effects of climate on different phases of conduct. For instance, his studies show that as humidity increases assaults, necessity for prison discipline, and the number of arrests for insanity decrease, while the data also show an increase in these same occurrences when the barometer is low.

Granting for the nonce that these various meteorological conditions could actually produce insanity, they could not account for the uniform variation of the proportion of the insane in the different states to which I have called your attention. Weather changes are transitory, and conditions that are inimical to mental health are quickly followed by others that are highly beneficial. This is especially true of those regions of the United States where the proportion of insanity is high. The ratio of insane in

* Edwin Grant Dexter, A. M.: Conduct and the Weather. Psych. Rev., Vol. II, No 10, May, 1899.

the semi-tropical regions, which are relatively free from the sudden changes of weather so common in the northeastern and northern central regions, is comparatively low. If we turn to the seasonal influences the same criticism applies, though the changes take a somewhat longer time. As regards climate and seasons, Berkley,* an eminent American authority, says: "These are factors of very minor importance in the evolution of insanity. The harmful effects of heat in the south are more than counterbalanced by the more prevalent abuse of alcohol in colder regions. In a general insane asylum, where the middle and lower classes of the population are received, a study of the records will show that a larger number of admissions in one year may occur during the winter, whereas in other years the same holds good for the spring, summer, or autumn. Hence one is obliged to conclude that the seasons have little to do with the evolution of insanity."

In the last analysis, however, the effects of all these agents which collectively I have spoken of as constituting man's physical environment upon his mind must be only secondary, mediate and not immediate. If we will study the effects of any one of them—for example, temperature, humidity, altitude—we will find them expressed in terms of respiration, pulse rate, evaporation from the cutaneous surface, blood pressure, &c.—effects which I grant you are potent, but which, nevertheless, are not primarily mental.

This whole matter reminds me very forcibly of the learned judge who could not understand why the expert called upon to testify as to the mental condition of the defendant should have measured his feet. The medical profession have been largely responsible for this conception, especially our misguided friend, the gynecologist. This gentleman has insisted that all forms whatsoever of mental disease affecting the female were traceable to an affection of the uterus or its appendages, and has devised all manner of operations to relieve such conditions. True, the insane female who may have a local pelvic condition which is amenable to surgical interference is just as much entitled to the relief that can be obtained from that source as her more fortunate sister, and it is quite conceivable that the relief of a local condition which was painful or debilitating by reason of frequent hemorrhages, or other cause, would place the organism in a better condition to rally from any abnormal state. But the sort of stuff that mind is made of is not to be found in the abdominal cavity.

This brings us again to the basis of our argument. If we are to seek for an adequate cause to explain the conditions to which I have directed your attention, we must seek for a mental cause, not a physical one.

If we look back over organic nature we shall see that in the progress of evolution the nervous system has come to play a progressively more and more important part until we get to the higher animals—the vertebrates—in which the brain comes to be of paramount importance.

Still, in the lower races of men, although the brain is of such great importance in the struggle for existence, that struggle is, after all, in the main and relatively a physical struggle; it consists largely of collecting food which is often ready at hand in the tropics, of pursuing and killing game, and often of personal encounters with his fellowman, as a result of which the conquered is killed or reduced to slavery. When we get to civilized man, however, the picture is different. Here the struggle for existence has become an essentially mental struggle, and success is a func-

* Henry J. Berkley. Insanity: General Etiology. Reference Handbook of the Medical Sciences, Vol. V.

tion of intellectual capacity. I can in no better way illustrate the severity of this struggle than by calling your attention to the fact that it takes twenty-five years of preparation nowadays before a young man is considered equipped to cope with his fellows.

The brain then becomes, as it were, the storm center in the organism. Here, in the habitation of the mind, do all the problems of subsistence meet their solution, and here also do all those mighty emotions which ever and anon stir the soul take their origin. It is here in the brain that vaunted ambition has its sway, and here that the sweet pains of love tune one soul in harmony with another.

The mind, delicately adjusted as it is to its environment, responding as it does to the slightest changes therein, occupies a dangerous position and becomes at once liable to great stress and to the multiplicity of disorders that result therefrom. The savage in his simplicity does not know what it is to suffer from the cares and worries which are the daily portion of the average European, and it is little wonder that the latter, beset by all manner of disappointments and vexations, should more frequently break down in mind than his less-gifted brother.

If you have followed me thus far, you will note that in my attempt to account for the geographical distribution of insanity in the United States I have discarded the influences of the physical environment as being efficient causes because of their indirectness, and have appealed to the immediate results of mental stress, the results of the contact of man with man in the struggle for existence; in short, the results of that struggle itself as exemplified in civilization.

If my contention is true, that insanity is the result of the stresses incident to the progressive civilized state, it must be possible to educe further proof of this by a study of some of the phenomena that accompany civilization. We would thus expect to find that in those localities where civilization was furthest advanced, where the social institutions were stable, where class distinctions had crystallized—in short, where the stresses of intellectual life were greatest—the proportion of insanity was highest. Let us see if this is so.

One of the most marked results of civilization is the concentration of population in certain areas. Let us study this condition in the United States with reference to the distribution of insanity. The census for 1890 shows that for the different regions of the United States the population per square mile is as follows:

North Atlantic Division	107.37
South Atlantic Division	32.98
North Central Division	29.68
South Central Division	18.94
Western Division	2.58

The North Atlantic Division, comprising the New England States, with New York, New Jersey, and Pennsylvania, has more than three times the number of inhabitants per square mile of any of the other divisions—in fact, more than all the rest put together. Of these states, Rhode Island, the smallest, has the greatest density of population, with 318.44 to the square mile; then comes Massachusetts with 278.48, Connecticut with 154.03, and down the coast, New York with 125.95, New Jersey with 193.82, and Pennsylvania with 116.88. From this center of density the proportion of inhabitants to the square mile diminishes regularly in every direction. If we go south, we find Maryland with 105 and Delaware with 86 per square mile, until in the extreme south we find but 30 or 40. Westward from Pennsylvania, however, we find a belt bordering the Ohio River, containing Ohio with 90, Indiana with 61, and Illinois with 68 per square mile, and from here the diminution is rapid to Louisiana with but 24, Minnesota with only

16, and the extreme West, where the proportion is less than 1.

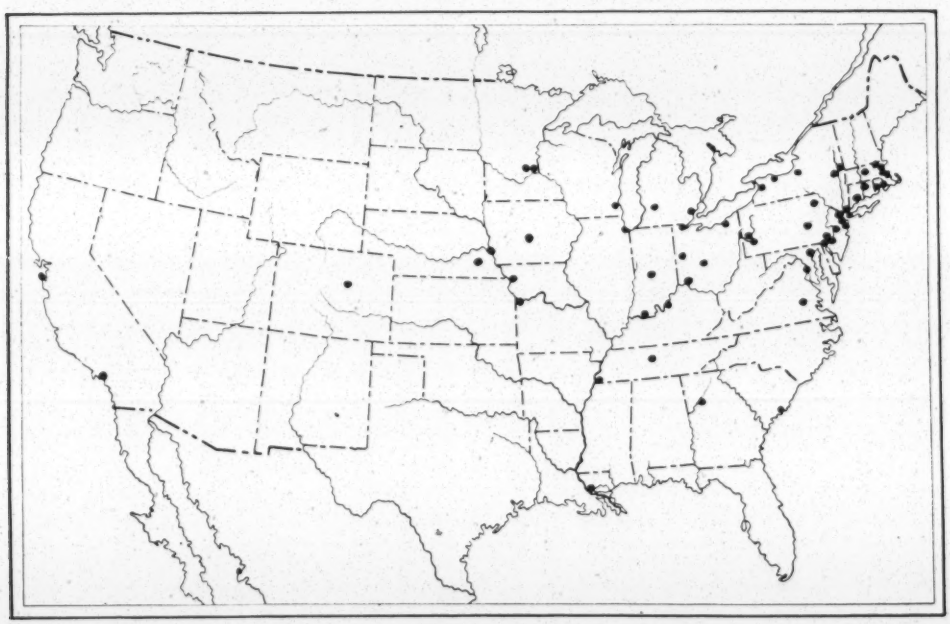
Here, you see, we have an almost exact parallel with the distribution of insanity.

Closely connected with this peculiarity of civilized communities to concentrate in certain areas—in fact, a part of the same phenomena—is the growth of great cities. The Eleventh Census shows that the percentage of the population of the United States living in cities of 8,000 or more inhabitants for the different regions was as follows:

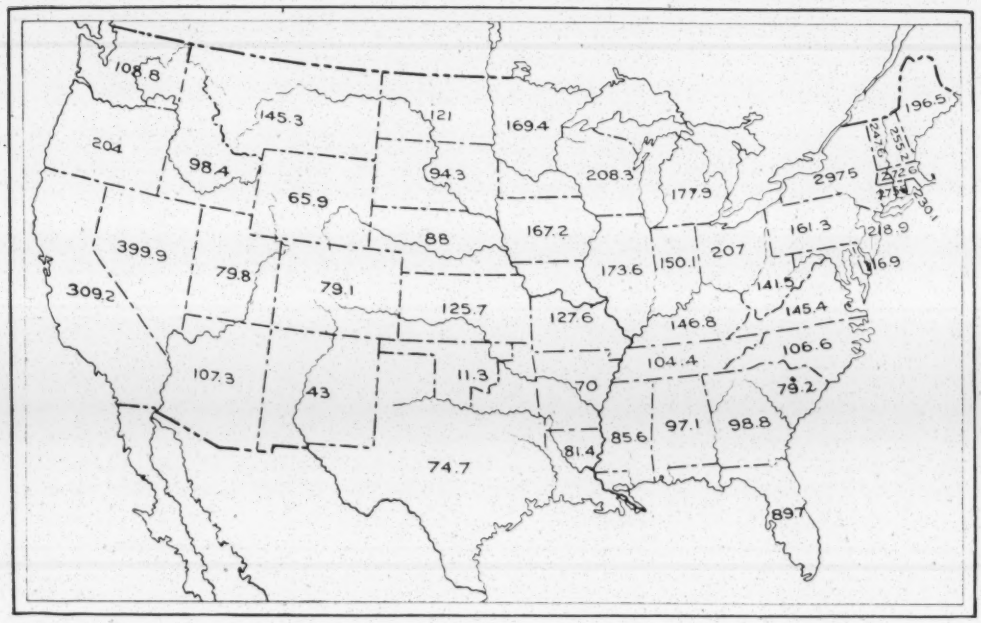
North Atlantic Division	51.58
North Central Division	25.91
South Atlantic Division	16.03
South Central Division	10.45
Western Division	29.99

Here again we see the same parallelism between the degree of manifestation of a phenomena of civilization and the proportion of insanity. The North Atlantic Division contains almost twice the percentage of urban population of any of the other divisions, and here, as we know, we find the highest percentage of insane.

If we calculate the proportion of insane per 100,000 in all cities of the United States containing 50,000 or more inhabitants, we will find that in 1880 the ratio was 231.6 as against 183.3 for the whole country, while in 1890 the ratio was 242.7 as against 170 for the whole country. Thus we find that the ratio of insane in cities of this size has not only increased in the decade from 1880 to 1890, but that the ratio for the whole country has decreased. It is also significant that, while in 1880 there were only 35 cities containing 50,000 or more inhabitants, in 1890 there were 58 such cities. We further find that of these 58 cities 26, or nearly one-half, are located in the North Atlantic Division. Of these 26, 6 are in Massachusetts, 7 in New York, 5 in New Jersey, 5 in Pennsylvania, 2 in Connecticut, 1 in Rhode Island, and none in Maine,



Outline Map No. III.—Location of Cities Having a Population of 50,000 or More, Census 1890



Outline Map No. IV.—Ratio of Total Insane per 100,000 Population, Census 1890

New Hampshire, and Vermont, so that our findings thus far are still further harmonized by these additional facts, for the density of population in Maine, New Hampshire, and Vermont is very much lower than for the other states in this region. (See outline map No. III.)

If, now, we study the movement of population during the past century we meet again the same confirmation for our views. *Mayo-Smith makes the statement that in 1790, 95 per cent of the population were on the Atlantic seaboard, with an average depth of settlement at right angles to the coast of only 255 miles. The stream of population spread westward along three lines—one the valley of the Mohawk, one from Virginia southwest into Kentucky and Tennessee by way of the Appalachian Valley, and one over the Alleghenies to the Ohio River. This latter course was the principal one, and from the junction of the Ohio with the Mississippi we find further westward migration occurring along the valleys of the Missouri, Arkansas, and Red Rivers. This course of the westward spread of population has been maintained, for, though river valleys furnish the natural highways for migration, when railroads come to be built they are built in the valleys, and the general course of events is not materially changed thereby.

See how closely these facts correspond with the distribution of insanity. From the northeastern coast states—Massachusetts, Connecticut, New York, and New Jersey—there is a progressive decrease southward along the Atlantic coast. There is also a decrease as we go southwest along the Appalachian Valley; but we find the ratio of insane continues high in the Virginias, Kentucky, Tennessee, and North Carolina, and does not show a marked falling off

*Richmond Mayo-Smith, "Statistics and Sociology."

until we get south of these states. Similarly, if we follow the Ohio Valley we find the ratio of insane continues large in Ohio, Indiana, and Illinois. (See outline map No. IV.)

We still have, however, some high ratios unaccounted for, viz., Missouri and Iowa west, Michigan, Wisconsin, and Minnesota north. All these states are in the North Central Division. Let us compare the different divisions of the United States on the basis of their respective increases in population during the decade from 1880 to 1890. The figures are as follows:

North Central Division	4,878,928
North Atlantic Division	2,984,480
South Central Division	1,985,657
South Atlantic Division	1,204,999
Western Division	1,129,641

Thus we see that the increase in population has been by far the most rapid in the North Central Division. This territory has increased approximately 2,000,000 inhabitants more than any other. Let us now turn to the individual states and see what the figures show. The states in the North Central Division which have increased in population the most are in the order of their increase:

Illinois	747,629
Nebraska	603,399
Minnesota	519,069
Missouri	510,262
Ohio	473,856
Michigan	451,170
Kansas	430,167
Wisconsin	367,420
Iowa	287,156

The only other states in the Union that have increased at any such rate as this are:

New York	911,173
New Jersey	313,103
Pennsylvania	972,962
Massachusetts	454,432
Texas	642,357
Arkansas	325,344
Georgia	294,992
Washington	266,999
Oregon	258,300

The significance of these figures seems to me quite evident. They show that the stream of population has continued west of the Mississippi, and the high ratio of insanity in Iowa and Missouri is therefore accounted for, as these states both adjoin Illinois, the western limit of the Ohio Valley lying merely on the other side of the Mississippi River. You will see also that we have incidentally thrown light on the high ratios north. In the three states in this region—Michigan, Wisconsin, and Minnesota—there has been an increase in population in the ten years from 1880 to 1890 of one and one-third millions.

Of all these states Nebraska alone seems to be somewhat exceptional. Although its population has increased rapidly its ratio of insanity is rather lower than we would expect from comparing it with those states where the increase has been correspondingly marked. Of these states Kansas is the only one as far west as Nebraska, and Kansas has a ratio of 125.7 per 100,000, while Nebraska has but 88. It is significant in this connection that Kansas is more directly in the line of traffic from east to west, and a glance at any recent map of the United States will show that many more railroads course through it than do through Nebraska. As both of these states are in the main agricultural, the higher ratio of insanity in Kansas would seem to me to be the result of the degenerate dribble from the great railroad lines as they pass west from the congested centers of population in the East.

The only reports of the railway mileage in these two states I have been able to obtain are one under date of 1893, which shows Kansas to have 8,900 miles of railroads, thus making it the second state in the Union in this respect, and one a year later in 1894, shows Nebraska to have but 5,529.22 miles of railroads.

It would seem, therefore, that my contention that insanity increases in

proportion as the stresses incident to the struggle for existence become mental stresses is borne out by the facts. The frontiersman who takes his family and goes west to open up new territory, engage in legitimate agricultural pursuits, and grow up with the country is pretty apt to be of hardy stock, and insanity, if it appears at all, comes in later generations. It is different, however, with those states that have great mineral wealth. Here the attraction appeals to all the wandering, unsettled, rifraff of the country, who hasten to the newly discovered fields in the hope of acquiring a fortune quickly. Arrived there they yield to all the seductions of intemperance; vice and disease wreak their ravages upon a predisposed soil, and our ratios show a corresponding increase. This is the situation with California. This state, and to a somewhat less extent the whole Pacific coast, is still suffering from the effects of the "gold fever" of '49, and its citizens are paying the price even "unto the third and fourth generations." In this connection it is interesting and significant to note that the mining states and the states of the Pacific slope, viz, Montana, Colorado, Arizona, Nevada, Idaho, Washington, Oregon, and California, all show a much greater number of male than female insane, a condition that prevails nowhere else in the country, with the single exception of Minnesota, and it has arisen here almost wholly in the decade from 1880 to 1890, during which period the state has increased in population over half a million. Minnesota also has large lumbering interests, and conditions in a lumbering region are similar to those in a mining region. In the normal order of things we expect to find a slightly higher percentage of insanity in the female sex, but the "get-rich-quick" fever attracts more men than women and mining districts as a rule are deficient in their proportion of women. This state of affairs has apparently not yet been recovered from in California. We must also remember with reference to California in particular that it is a coast state and suffers from the effects of immigration, and that the percentage of insanity is invariably higher in the foreign born than in the native population.

This law of the increase of insanity in the oldest settled districts and its decrease in the newly settled districts is well stated by A. O. Wright in the Proceedings of the National Conference of Charities and Correction, in 1884. He says: "A very powerful cause for the increase of insanity in this country was, so far as I know, first pointed out by the writer in 1881, before the census of 1880 had been tabulated, in the Annual Report of the Wisconsin State Board of Charities and Reform, and was stated in debate at the National Conference of Charities and Correction, at Madison, in 1882. Having made a census of the insane under public care in Wisconsin, the writer, on reducing the number by counties to the ratio to the population of the several counties, was astonished to find here a general law: That the older settled counties had the largest ratio of insane to the population, and that the ratio steadily decreased and reached the smallest ratio in the pioneer counties on the north. This seemed to show that a new country has a smaller proportion of insanity than an old country.

"When the Compendium of the Census of 1880 was published, the writer, from the numbers given then, immediately calculated the ratios to the population and arranged the states and territories geographically instead of alphabetically." From the figures thus obtained he concludes that "* * * allowing for exceptional cases, the proportion of insanity decreases as you go toward the newer settled states, from about one in every 350 of the population in Massachusetts to about one in 1900 in Colorado."

Wright, however, does not go into details nor discuss the causes that have led to this condition of affairs, except to say: "The reason of this I think to be that new settlements are made by a selected population, mostly young and middle aged people of sound minds and bodies. The insane are left behind, as are also those people of bad organizations, from whose numbers the most of the insane will come. The new countries therefore have a small proportion of insanity at the start, and furnish a small proportion of insanity in the first generation.

"The only exception to this is in the case of the Pacific slope and a few other localities, where masses of homeless men, with few women and children, have gone in search of work or wealth; where the vices of drunkenness and licentiousness, with the irregularities and the hardships of life in mining or lumbering camps, and the excessive fluctuations of fortune, have caused an excess of insanity. In these cases it is, however, to be remembered that this is a disease of mature life; and if we add the proper proportion of children who would be found in an ordinary community, and who rarely have insanity, we should at once halve the ratio of insanity in such communities.

"But, in ordinary settlements, where the settlers found homes and live under the ordinary conditions of life, the ratio of insanity in the first generation is small, because they are, as the insurance men would say, 'selected lives.' In the second generation all the complex and varied causes which produce insanity have been at work; and the second generation has a much greater ratio of insanity than the first, and so on for several generations, when the balance is restored and the regular rate of insanity is reached."

After all this, however, Wright says: "It is often claimed that insanity is a disease of civilization, and that it is increasing because civilization is increasing. This I think to be a mistake." Although this is not a very happy way to express it, it seems to me that our figures prove just that, or rather if they do not prove that insanity is the necessary result of civilization, they at least prove that the civilized state offers those conditions in greater number which bring it about, and so if the connection be not one of necessity, it is at least one of fact. Instead, therefore, of attempting to account for insanity by altitude, temperature, and the various other elements of the physical environment, we should only consider these factors as important because of their influence in creating conditions favorable to the growth and concentration of population and the evolution of the social organism. Even here this influence is often secondary or accidental. As regards this whole matter of the influence of the physical environment on population, I can do no better than quote Mayo-Smith,* who, in answer to the question, "How far can the statistics of distribution be said to contribute an answer to the question of the influence of physical environment upon population?" says:

"Statistics show us, in a large way and on a grand scale, the general influence of land, climate, and natural forces upon population. The plains attract, the mountains repel. Cold regions are unpopulated. Moist and warm climates are fatal to human life. Commercial position attracts cities. Navigable rivers are natural highways, and are utilized in the migrations of the human race. An indented seacoast is favorable to settlement and colonization. Statistics confirm the general observations of history. Levasseur, after a long survey of the topography of France and the history of its population, says that at all periods Paris has been the attractive pole and the mountainous region of

* Ibid.

south France the repulsive pole of population.

"But it is absurd to seek by statistics a direct mathematical relation between population and land. The population of a country is not dense exactly in accordance with its topography. Plains do not always have a dense population, and mountains are not always barren. Population does not increase or decrease regularly according to distance from a certain parallel of latitude or longitude. There is no direct proportion between the degrees of temperature or inches of rainfall and the number of inhabitants in a certain district. In this respect many of the statistics distributing population according to topographical features or natural relations, such as those of the Tenth and Eleventh Census of the United States, are the merest vanity. One searches in vain in these elaborate tables for any illumination. Such influences are not direct, but indirect. Altitude, temperature, rainfall, influence population because they affect the economic resources necessary for population. We must always remember that economy is the basis of social organization. The economic is the fundamental side of civilization. Natural forces control human life in this way. Statistics, by showing the distribution of population, discloses the harmony between population and nature, which is mediated by economic relations, and these are on the one side the result of natural forces, and on the other the conditions of human existence.

"We must also remember, in studying the distribution of population, that there are commonly many influences at work—some of them economic, others historical and political—and that it is often extremely difficult to disentangle them. We ought, therefore, to expect from statistics not exact data, but only general indications of the influence of natural forces. The density of population in England, for example, is due partly to the richness of its soil, partly to its mineral resources, and partly to its commercial advantages; but it is due also in part to its insular position, which has given it peace and stable government for generations, and to the energy and enterprise of its inhabitants, which have made the little island the center of a world empire. It is impossible for statistics to disentangle these different influences. It can only confirm the observations of history. Who could explain that oasis of population in the great western plain of the United States called Utah, if he did not know the history of the Mormons? Why should the sterile mountain tops of Nevada be populated? might be asked by one who did not know the history of gold and silver mining. The coast swamps of the United States would probably be uninhabited did not the population of the United States include a large proportion of negroes, who are proof against pestilential fevers. Race explains in this case what physical geography would leave inexplicable.

"Finally, we must remember that all these natural influences are much more powerful over primitive than over civilized man. As Spencer says, 'The earlier stages of social evolution are far more dependent on local conditions than the later stages. Those societies such as we are most familiar with, highly organized, rich in appliances, advanced in knowledge, can, by the help of various artifices, thrive in unfavorable habitats; yet feeble, unorganized societies cannot do so; they are at the mercy of their natural surroundings.' Spencer finds here also the explanation of the fact that so many tribes of savages have made no manifest progress during the long period over which human records extend. Statistics observes man only in an advanced state of civilization, when he has been able to free himself to a certain extent from the influence of natural forces, or at least to neutral-

ize them. By clothing and improved shelter man habituates himself to almost any climate, and by sanitary knowledge he makes places formerly uninhabitable safe for human life. In pursuit of wealth, of political independence, of religious freedom, he will risk exposures which would seem to be entirely unnecessary. By improved methods of agriculture man often renders districts formerly uninhabited, or at best only sparsely settled, capable of sustaining large populations. In early times regions covered with forests are thinly inhabited. Civilized man cuts down the forests and turns the land into arable fields. Lowlands, which in early times were at the mercy of the sea or uninhabitable on account of fevers, civilized man, by canals and dikes, renders fertile plains. So also by means of fertilizers, by rotation of crops, by improved ploughing, by the use of machinery, sometimes by irrigation, dry and sterile plains are made productive. Even from year to year changes in agriculture or in the prices of agricultural crops may render it expedient to change arable land into pasture, or pasture land into arable, and either process, if continued, must influence the population-supporting capacity of the country. An example of this is seen in the changing of arable land to pasture in Ireland and the turning of little farms into game preserves in Scotland.

"In the civilized state man often makes use of a country without any reference to its agricultural capacities. He seeks the minerals under the soil either for his own consumption or for export; he turns clay into pottery; he utilizes water power for his factories; he seeks barren coasts for fishing or gathering sea weed; he establishes trading posts in the desert or in unhealthy localities—in other words, he seeks his gain without reference to climate or soil. In modern times the improved means of transportation have still further increased man's command over nature. He is no longer held to rivers and valleys as natural highways, but can seek the quickest and most direct route. Cheapness of transportation gives him command over the resources of the world. In this way he can carry on the work of production in any place he likes, without regard to its food-producing capacity. The people of England import three-fourths of the bread they eat. This has the effect of enabling man to concentrate his efforts in places most favorable to the production of the kind of wealth which is demanded. It enables him also to choose climates favorable to his health, as the English seek the Mediterranean, or consumptives of the East seek the dry air of Colorado. Man's intellectual and emotional desires lead him to seek large cities, and this he is enabled to do by the fact that he can carry on his occupation independent of the food supply. This is especially true of occupations demanding intellectual effort.

"It will be seen, therefore, from all these considerations, that man is still subject to the environment; but the development of his power over nature has rendered the cord which binds him down more elastic. He is still subject to nature, but has at the same time, to a certain extent at least, subjected her."

Thus far my lecture has dealt with—

First. The untenability of any hypothesis founded solely upon climatic, meteorologic, or topographic conditions to explain the facts of the distribution of insanity in the United States.

Second. The necessity of assuming primarily a mental cause to explain these facts and the nature of that cause, viz., the mental stresses incident to the progressive civilized state.

Now, as a *Third* line of argument I will take up the discussion of certain collateral evidence—that is, evidence taken along other but related lines and leading to the same conclusion.

Suppose we first examine into the statistics of suicide. Morselli in his admirable work on that subject comes to the conclusion that those sections of Europe show the highest percentage of suicide where the Teutonic element is predominant. Ripley in his excellent work, "The Races in Europe," has examined this proposition critically and with very interesting results.

If, for instance, France is studied we will find the greater proportion of suicides in the north, where the Germanic race is represented in greatest numbers; similarly we find here also the highest divorce rate; but, more remarkable still, we find evidences of the highest degree of culture. In this same region the greatest number of artists were born to whom were granted awards by the Paris Salon, and here also were born the highest ratio of men of letters. If now Italy be similarly studied we find that its different regions are distinguished in much the same way as they are in France by a preponderance of certain phenomena in certain localities. In comparing the two countries, Ripley closes his criticism by saying: "The effect has been to emphasize once more the enormous preponderance of artistic genius all through the north, from Tuscany to the Alps. How does this coincide with our previous deduction concerning France? It seems, perhaps, to corroborate the relation of Teutonism to art, until we secure the fact that all northern Italy is overwhelmingly Alpine by race as compared with the artistically sterile south. Couple with this the fact that in reality Teutonism is a negligible factor in Italy, physically speaking, and that precisely the same ethnic type which is so fecund culturally in Italy is in France the one localized wherever art is not and all doubt as to the predominant cause of the phenomenon is dissipated. We see immediately that the artistic fruitfulness in either case is the concomitant and derivative product of a highly developed center of population. Contact of mind with mind is the real cause of the phenomena. It is not race but the physical and social environment which must be taken into account."

Morselli himself recognized this fact, for he not only reaches the conclusion that "it is those countries which possess a higher standard of general culture which furnish the largest contingent of voluntary deaths," and "The proportion of suicides in all Europe is greater amongst the condensed population of urban centers than amongst the more scattered inhabitants of the country;" but in concluding his work he sums up the whole matter in the following words: "* * * whoever has followed us in the long analytical course which we have pursued ought now to be convinced of the connection between competition and social evolution and the inclination towards suicide. Suicide increases amongst people according to their degree of civilization, not so much because in the high development of the cerebral organism the needs which must be satisfied increase as because the brain shares more largely in the struggle."

I need only call your attention to the frequent association of suicide with actual insanity, or at least with an abnormal mental condition, for you to see the bearing of these results on the problem in hand.

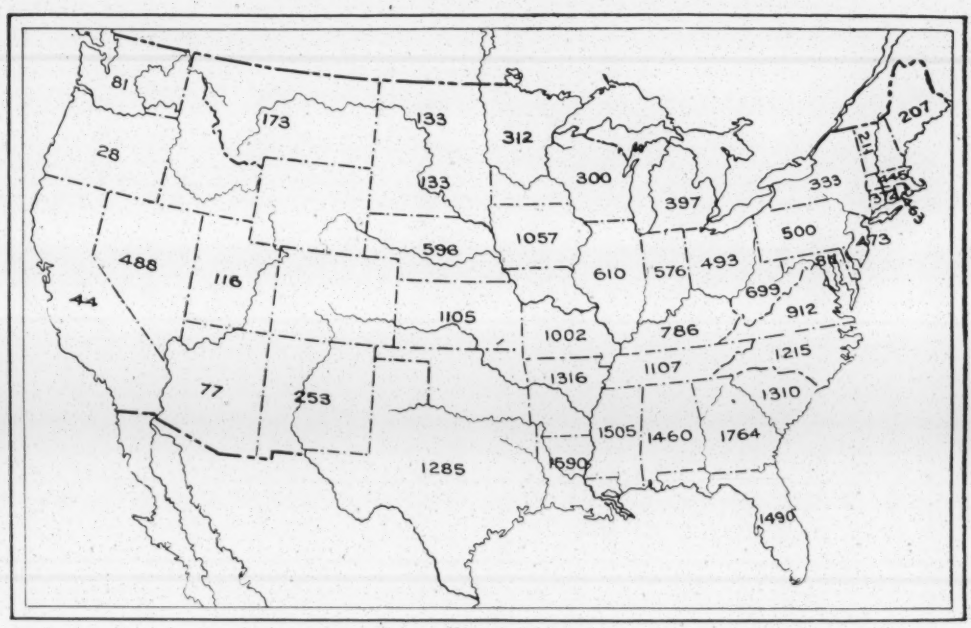
Pauperism is another allied condition to which I would direct your attention. The census of 1880 shows that there were then 66,203 paupers in the several almshouses of the country. Now, pauperism is to an extent a symptom of mental defect. The individual who, unless absolutely incapacitated by physical disability, so far fails in the struggle for existence that he must be supported at the public expense is certainly suffering from some form of mental defect. F. H. Wines, the special agent of the Census Office for the collection of the statistics of the defective, dependent,

and delinquent classes at the Tenth Census, says about pauperism: "The law which governs the distribution of pauperism in the United States (and which, we believe, has not been suspected by any student of the subject—at least I have never seen any reference to it) is brought out as clearly by the census of 1850 as by that of 1880, and it is confirmed by every census that has been taken. This law is as follows: The ratio of paupers to the total population diminishes alike from north to south and from east to west. In other words, if New England, or the principal New England state (Massachusetts), be taken as a starting point, it matters not in which direction a line be drawn, the largest amount of pauperism relatively to the population will be found to exist in Massachusetts, and the smallest in the state farthest removed from Massachusetts, while the intervening states will exhibit, on the whole and with scarcely an exception, a gradual decline in something like the degree of their removal from the extreme northeast." As clearly as Mr. Wines defines this law, it is rather strange that he did not discover the practically identical condition relative to the insane.

We have one other state of affairs in the United States that is worth while looking into. I refer to our large negro population. The ratio of insanity in the negro population is smaller than in the white population, being as 1 to 1,069 in the former and 1 to 505 in the latter (Census 1880). Although this is so, it is generally admitted that the percentage of insanity has been gradually increasing since the Civil War. Berkley* says on this point: "Before the Civil War there were few or no psychoses among them, and such organic degenerative diseases as syphilitic insanity and dementia paralytica were practically unknown. Today in communities where many are collected, as in Washington or Baltimore, the percentage of insane

* Ibid.

Outline Map No. V.—White Insane Only, Census 1880



Outline Map No. VI.—Number Colored Population for Each Colored Insane, Census 1880

Ratio for United States	1,069
Ratio for Southern States	1,277
Ratio for United States minus Southern States	542

negroes, not to mention idiots and imbeciles, is already fully up to that of the Caucasian races, with whom they are associated, and bids fair to surpass it."

*"The negro has been thrown upon his own physical and mental resources and has entered the strife for existence as an inferior; he is syphilized, alcoholized, his food is ofttimes unsuitable, * * * his surroundings are usually unhygienic, and tuberculosis finds in him an easy prey. No wonder it is that under these circumstances we have in our asylums an ever-increasing number of idiots, of imbeciles, and of all types of the dementias from the colored race."

There are, however, some extremely interesting facts relative to this increase. The percentage of colored insane increases rapidly as we leave the natural home of the negro and go in any direction. In other words, as soon as the negro goes North and enters into active competition with the white, who is mentally his superior, he succumbs to the unequal struggle. So in Georgia, where we find the greatest number of negroes, there was 1 insane negro to 1,764 of the colored population in 1880, while in New York the ratio was 1 to 333, or almost exactly the same ratio as for the white population. (See outline maps Nos. V, VI.)

Then, again, if we take the Southern States alone, viz., Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia, we find the ratio of colored insane 1 to 1,277, while for the whites in the same territory it is 1 to 456. For the

* A Treatise on Mental Diseases.

remainder of the United States the ratio of colored insane as shown by the Tenth Census was 1 to 542, while for the whites it was 1 to 520. The ratio of colored insane in the United States, minus the Southern States, is then almost exactly the same as the ratio for the white insane.

It seems that all the lines of evidence I have followed up lead to the same conclusion; they are mutually confirmatory of the general law that the proportion of insane is highest where we find the greatest congestion of population, and, therefore, where the stresses incident to active competition are most severe. Our inquiry thus far, however, has been nothing if it has not been an inquiry into the causes of insanity, and I think I may fitly close by a general discussion of causes with a view to indicating some general conclusions relative to the comparative influence of these mental stresses I have been discussing in the actual production of insanity.

If we will take up any annual report of an institution for the insane and turn to the table giving the causes of insanity in the several patients under treatment, we will find assigned such causes as these: "business anxiety," "death of mother," "disappointment in love," "domestic troubles," "excessive study," "loss of property," "political excitement." How many of us but have suffered at some time or other from one or perhaps all of these so-called causes of insanity? Certainly we have all had business worries; certainly we have all lost property at some time, otherwise our good fortune is phenomenal; certainly we have all been subject to political excitement many times, and all of us presumably have lost a dear friend or relative, perhaps a father or mother. Dr Carlos F. MacDonald says very forcibly on this subject, "* * * that substantially every individual at some time during his life is exposed, in many cases repeatedly, to many of the so-called exciting causes of insanity, both mental and physical, and yet, despite this fact, we find that sanity is the rule—insanity, the exception."

In ascribing these causes what has been done is simply this: The particular set of conditions that happened to maintain at the time the patient was attacked with insanity have been tabulated as the causes of that attack, whereas the true cause was in all probability far removed from these which were in reality only accidental contemporaries. In reality the true underlying condition in all these cases for which such causes are assigned is the predisposition to insanity.

Predisposition to insanity may be either inherited or acquired. The former is more generally recognized and is what is referred to when insanity is said to be hereditary. Of all causes of insanity heredity is recognized as being by far the most important and as being most frequently present. The average for all countries has been estimated at from 60 to 70 per cent. This I believe, as a matter of fact, falls below the truth. But any one who is at all familiar with the collecting of statistics must know how impossible it is for them to fully represent the facts in such a matter.

Next to hereditary predisposition comes acquired predisposition as a factor in causation, and the two most important agents in bringing about this acquired predisposition are generally acknowledged to be, first, alcohol, and second, syphilis, both of which, however, may act as true exciting causes at times. It is further conceded that both of these causes are much more prevalent in civilized communities, and in fact seem to be fostered by that irregular life which the active struggle after wealth necessitates.

The inadequacy of predisposition alone to account for insanity, especially acquired predisposition due to alcohol,

syphilis, and tuberculosis, without the element of mental stress is well illustrated by the condition of the American Indian. Sorely afflicted as he is by the diseases and vices of civilization, his tendency is to an outdoor life, and as his land has disappeared and he has become physically incapacitated, the government has supported him, so that his sufferings have been in the main physical and not mental. Careless, slovenly, and improvident, he does not know much of worry for the morrow, and so we find that among his race "insanity is of rare occurrence." *

Without wearying you with further figures I will simply call your attention to the new light in which our conclusions now appear. Insanity is most frequent in the older civilizations, in the more thickly settled communities, in urban centers—in short, where competition is most active. Here the weakling, the man whose mental faculties are not quite up to grade, who enters in the struggle handicapped by a poorly equilibrated mind, goes to the wall. He is the victim of heredity. Here are bred all the vices which only a high grade of intelligence can call into being; stimulants, narcotics, drugs of all kinds are available to help the overburdened on their way, until at last they react and bring ruin and desolation. The victims who fall a prey to these temptations are the victims of an acquired predisposition.

Of these two varieties of causes heredity is by far the more important. While civilization furnishes the environment that makes a bad heredity doubly dangerous, still it is the heredity which is the prepotent factor and not the environment. A bad heritage is always a source of danger, and its possessor can never know when the environmental conditions may appear which will make its latent activity kinetic. No people in the world are freer than we are from the taints of vicious inheritance. Inhabitants of the most glorious country on earth, a country whose future for greatness and power and good seems to have no limit, let us see that we make the best possible use of the bounties nature has showered upon us with so prodigal a hand.

But power and greatness are double-edged; they cut both ways; and already we are threatened with the dangers they have brought in their wake. The offscourings of all Europe are hastening to our shores for that wealth they expect to find ready at hand, and today 50 per cent of the nearly 25,000 insane of New York State are foreign-born. The result of this great influx of defectives must of necessity have a constant leavening effect on the whole population. The danger from this source, however, is as nothing compared to that from war, the greatest curse that can afflict a nation.

In war it is not the defective that goes down to death, but the flower of a nation's manhood, and if modern theories of heredity are correct, their place can never be filled. Once gone, they are gone forever, while the maimed, the diseased, the imbeciles and degenerates, unable to sustain the hardships of campaigning, stay at home and help populate the country with their ilk. I believe one of the principal reasons for this country's great prosperity lies in its freedom from foreign wars, and I am convinced that no more terrible calamity could happen to it than to be engaged in one.

If we can control these two sources of evil successfully, I am sure that internal affairs will so shape themselves as not to seriously interfere with a future which, I believe, can today only be dimly imagined, a future which will outshine the glory of ancient Rome as good outshines evil.

* "The Civilized Indian, His Physical Characteristics and Some of His Diseases", by A. D. Lake, M. D. Trans. N. Y. Med. Soc., 1902.

PEARY AND THE NORTH POLE

THE announcement of Commander Robert E. Peary that he is to make one more attempt to reach the North Pole has been received with much enthusiasm. Every one has been hoping that he would be able to carry out the plan which he has adopted for his next Arctic campaign, a plan which he outlined some months ago when it was doubtful whether he would ever go north again. This plan differs in one very important respect from all his former campaigns in that he proposes to make his winter camp fully one hundred miles north of his previous winter quarters; so that when he is ready to start on his dash in spring he will be 100 miles nearer his goal. The distance thus saved—from Cape Sabine to Cape Joseph Henry—is the most difficult of traverse, and to overcome it has in the past taken several weeks of the short working season.

The distance from Peary's proposed winter camp near Cape Joseph Henry to the Pole and back again is less than the average distance of four sledging trips which he has made, and each of these trips was over rougher ice than it is believed will be encountered beyond the 84th parallel. Mr Peary will start north in July, 1904. He hopes to be able to reach Cape Joseph Henry with his vessel in the fall of that year, and to make his dash in 1905. In case he does not reach the cape in 1904, he will spend 1905 in getting there, and make his dash in 1906. His plan is outlined in the following letter, addressed to the Secretary of the Navy, asking for three years' leave of absence:

WASHINGTON, D. C.,
September 2, 1903.

SIR: Referring to my application for leave of absence accompanying this, I beg to state for your information that I propose to secure a suitable ship, put her into one of our best shipyards, have her reënforced and strengthened to the maximum degree and fitted with American engines, possessing the maximum of strength and power with the minimum weight and space, so that she may go north as an exponent of American skill and mechanical ability.

With such ship I should sail north about the 1st of next July, and on reaching the Whale Sound region should take on board my Eskimo, establish my permanent sub-base at Cape Sabine, and then force my way northward to my proposed winter quarters on the northern shore of Grant Land, establishing caches as far as practicable en route. By the earliest returning light of the following February I should start due north over the polar pack with a small, light pioneer party, followed by a large, heavy main party. I should expect to accomplish the distance to the Pole and return in about 100 days or a little more, an average travel of about 10 miles a day. Returning, I should break the ship out late in the same season and return home.

If ice conditions the first year were such as to prevent reaching the northern shore of Grant Land, I should winter as far north as practicable and force the ship to the desired location the following year. In this event the expedition would be gone two years.

This plan is the result of some twelve years of almost continuous experience in those latitudes, and is based upon an extended personal acquaintance with the region from Sabine to 84° north latitude and a thorough familiarity with climatic and other conditions and with Eskimo.

The distinctive features of my plan are: The use of individual sledges with comparatively light loads, drawn by dogs, giving a traveling unit of high speed and radius of reach, as opposed to the man sledge, with its heavy load, slow speed, and limited radius; the

adoption of Eskimo methods and costume and the fullest utilization of the Eskimo themselves.

The advantage of my plan and route are a fixed land base 100 miles nearer the Pole than on any other route, a more rigid ice pack extending Poleward than is to be found on the opposite side of the Pole, a wider land base upon which to retreat, and a well-beaten line of communication and retreat from winter quarters to comparatively low latitudes, which is practicable at any season of the year.

The work outlined above comprises two distinct stages, viz., the navigation of the ship to the northern shore of Grant Land, the traverse of the polar pack with sledges from the northern shore of Grant Land to the Pole and return. In connection with the former, four ships (the *Polaris*, the *Alert*, the *Discovery*, and the *Proteus*) have accomplished this feat. In regard to the second, I have already made four trips in those same regions, in which the average air-line distance from start to finish was the same as the distance from Grant Land to the Pole. The air-line distance from start to finish of my 1900 sledge journey was such that had my starting point been the northern shore of Grant Land it would have carried me beyond the Pole and return. I beg to state for your consideration the following:

The North Pole is the last great geographical prize the earth has to offer. Its attainment will be accepted as the sign of man's final physical conquest of the globe, and it will always stand as one of the great milestones in the world's history.

The attainment of the North Pole is, in my opinion, our manifest privilege and duty. Its attainment by another country would be in the light of a reproach and criticism.

The sense of all the foremost geographers, practical and theoretical, now converges upon the Smith Sound or "American route," along which I have been working for years past. Other routes have been eliminated. If we delay in preëmpting this route some one else will step in and win the prize.

I believe that my experience, gained in years of practical work; my special methods of travel and equipment, the evolution of years of practical work; my personal acquaintance with every feature of my chosen route and region, and my command of the full resources and utmost efforts of the entire little tribe of Whale Sound hyperboreans, who have lived and worked with me for years, give substantial reasons for anticipating a successful outcome to an expedition based on the above lines.

Very respectfully,

R. E. PEARY,
Civil Engineer, U. S. N.

The reply of Hon. Charles H. Darling, Acting Secretary of the Navy, granting Mr Peary's application, is as follows:

DEAR SIR: In granting you leave of absence for the purpose of prosecuting your Arctic work, I am moved to remark that I believe you are better equipped than any other person in the country to undertake this work. You have the requisite courage, fortitude, and physique. You have had a longer term of service within the Arctic circle than any other explorer. You have had large experience in sledge journeying, both upon the land and upon the polar pack. You are familiar with ice conditions through the Smith Sound route and north of Grant Land and the continent. You have demonstrated your ability to maintain yourself in that latitude for a longer period in health and safety than any other explorer. You have reduced the inconveniences and hardships of the Arctic service to a minimum.

You are conversant with the language and customs of the Whale Sound Esquimaux and are personally acquainted with every individual in the tribe.

They have become accustomed to your leadership, and if you succeed in transporting the selected hunters and the best families to the north shore of Grant Land, as you propose, you will thereby establish a base which will enable you to live in safety and comparative comfort for an indefinite period.

Grant Land as such base has great advantages over Spitzbergen, Franz Josef Land, or any other known point, in that it has an extensive shore line, which a party retreating from the Pole cannot fail to find, whatever may be the extent of the polar drift.

In establishing a colony of Esquimaux at this point, you thereby establish a self-sustaining base at the nearest practicable point to the Pole. Such self-sustaining base has not heretofore been established in any such high latitude. Your ability to force your ships to a high northing with this Esquimau colony is all important to your success. Such northing has been made by the *Polaris*, the *Alert*, the *Discovery*, and the *Proteus*. There would seem to be no reason why you can not do the same. Knowledge of ice conditions that has been gained since that time will certainly enable you to provide a ship better adapted to the purpose than either one of these.

The attainment of the Pole should be your main object. Nothing short will suffice. The discovery of the Poles is all that remains to complete the map of the world. That map should be completed in our generation and by our countrymen. If it is claimed that the enterprise is fraught with danger and privation, the answer is that geographical discovery in all ages has been purchased at the price of heroic courage and noble sacrifice. Our national pride is involved in the undertaking, and this department expects that you will accomplish your purpose and bring further distinction to a service of illustrious traditions.

In conclusion, I am pleased to inform you that the President of the United States sympathizes with your cause and approves the enterprise.

With best wishes for your health and confidence in your success,

I am, respectfully,

CHARLES H. DARLING,
Acting Secretary.

The Peary Arctic Club, which so generously supported Mr Peary's explorations 1898–1902, have contributed the funds that make this new expedition possible.

THE INFLUENCE OF FORESTRY UPON THE LUMBER INDUSTRY OF THE UNITED STATES*

BY OVERTON W. PRICE,

ASSISTANT FORESTER, BUREAU OF FORESTRY

THE development of the lumber industry in this country is without parallel. It now ranks fourth among the great manufacturing industries of the United States, and represents an invested capital of about $611,000,000 and an annual outlay of over $100,000,000 in wages. It af-

*Republished from the Year Book of the Department of Agriculture for 1902.

fords through its three great branches—the logging industry, the sawmill industry, and the planing-mill industry—a means of livelihood to considerably over a million persons. The annual value of the products, which has multiplied nearly ten times in the last half century, is $566,000,000.

But although the rapid development of the lumber industry has had far-reaching results in furthering every branch of manufacture which depends upon wood, it has been fundamentally unsound in principle. The settler who cuts and sells trees without forethought from land fit only for forest growth has not enriched himself in the long run. The havoc which has been wrought in the forests of the United States has turned trees into money, but has put the balance on the wrong side of the sheet by rendering vast areas unproductive. It is the history of all great industries directed by private interests that the necessity for modification is not seen until the harm has been done and its results are felt. This fact has been emphasized in the lumber industry—in the earlier days by the instinctive feeling of the colonist against his natural enemy, the forest, and later by the remarkable inducements offered by lumbering for present profit only.

The first settlers had two objects in view in their attack upon the forest—the one to clear land for their farms, the other to procure wood for their buildings, fuel, and fences. As the tide of colonization rose, and as the uses for wood in manufacture increased in number and extent, lumbering rapidly assumed the proportions of a business enterprise, and from supplying only personal wants it became profitable to supply also those of others. With an apparently inexhaustible supply of timber available, and with an insistent and growing demand, the lumber industry came to offer remarkable opportunities for money-making. Step by step with its development improvement in tools and machinery took place. The changes that enterprise and ingenuity have wrought in the American sawmill are no less wonderful than those which have taken place in the American locomotive. From "whipsawing," in which the boards were sawed out by hand, to the modern steam sawmill, with its railroad, its planing mill, and its cut of nearly half a million board feet per day, is a long step, but it has not taken much over fifty years to accomplish it. In effective methods for the harvesting and manufacture of lumber the American lumberman has no superior, nor is he equaled in his disregard for the future of the forest which he cuts.

It is natural that the lumberman should not turn eagerly from a system whose only aim is to secure the highest possible present profit from the forest to one which includes provisions for the production of a second crop upon the lumbered area. Under conservative methods lumbering becomes a legitimate industry for the production as well as for the consumption of its staple. It no longer offers, however, the short cut to fortune which it proved to be so long as an abundance of timber rendered the old methods of lumbering possible. It is difficult for lumbermen generally to realize that the time for practical forestry has fully arrived, but signs more significant than any existing statistics point to the imminent failure in the supply of certain timbers in the United States. From the data available there is no way to foretell accurately the time necessary to exhaust this supply of merchantable timber at the present rate of consumption. A good many estimates of the merchantable timber standing have been made, some of which have already proved fallacious.

To predict accurately how long it will be before the United States is con-

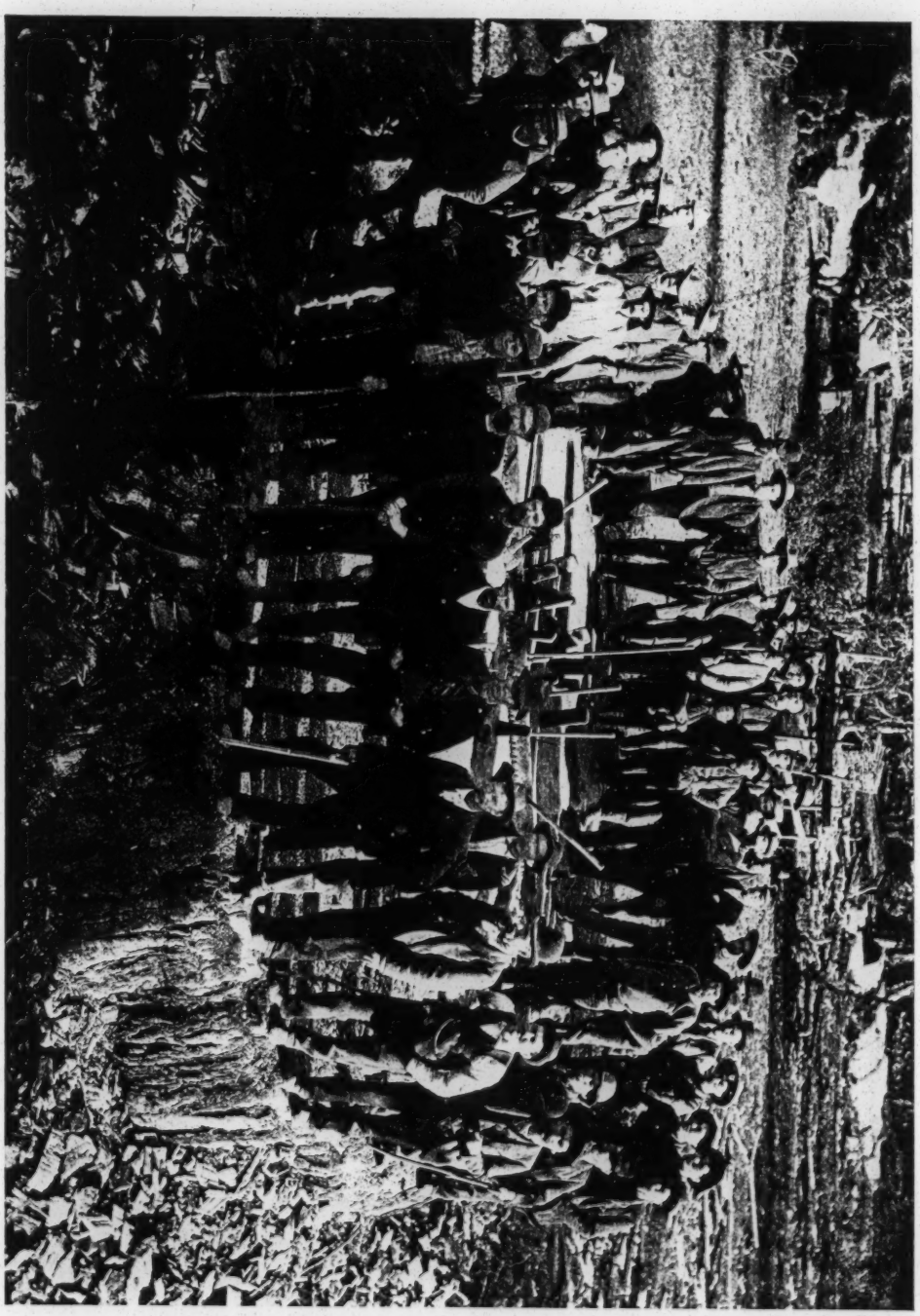
From the American Museum of Natural History

The Cross Section of a Giant Sequoia

fronted by a timber famine would require first of all a knowledge of the composition, quality, and condition of the forests, which it would take many years to obtain. At present such an estimate is of little practical value. We do know that the supply of timber of many kinds is failing, of other kinds is almost exhausted, and of others is practically gone; that black walnut is no more to be had except in small quantities and at enormous expense; that first-growth white pine is growing rapidly to be a rarity on the market; that where the supply of spruce for pulpwood and for lumber for the next ten years is to be found is a grave question before the lumbermen today. The list of woods accepted as merchantable lengthens from year to year, species hitherto considered valueless being harvested more and more willingly as the result of the exhaustion of more valuable kinds. In spite of steady improvement in tools, logging outfits, and mill machinery, all tending to cheapen the cost of lumbering, the price of lumber increases steadily and rapidly. These are facts more significant than predictions in terms of years of the life of the lumber industry. The exact period for which the existing supplies are sufficient is a matter of detail. The vital point lies in the crisis which the lumber industry is approaching in the exhaustion of the material on which its existence depends.

The general application of forestry to forest lands owned by lumbermen will probably result in the gradual elimination of the large sawmill and the substitution of those of moderate size. The mammoth milling plant will be rare when only second growth is left to supply it, for the area of timber land sufficient to produce the logs necessary to run such a plant is enormous. It is reasonable to expect that the mill of moderate size, supplied by a forest whose production is equal to the mill's annual capacity, both under the same management, will become more and more the rule. The very existence of the enormous mill is the result of an abundance of timber resources, which exist no longer except in a very few sections. In Europe the long-continued application of conservative measures in lumbering has resulted in a distribution and type of sawmill little known in this country. Sawmills of large size do not exist, but in their stead small sawmills, for which water generally supplies the power, are distributed throughout the country wherever the local demand is sufficient to keep them running. Their annual cut is for the most part exceedingly small, according to our standards, and sufficient only to supply the wants of the immediate adjacent country. The mills saw largely on order, and the fact that their construction is permanent and their motive power cheap enables them to run intermittently without loss. The results are upon the whole exceedingly satisfactory. The man who wants lumber gets it promptly, and without paying an added cost for long transportation. The antiquated construction of European sawmills is often such that the American lumberman would find in them but a proof of his superior ingenuity; but the European distribution of milling plants has its strong advantages in several ways.

The general application of conservative methods in lumbering will inevitably result, as has been the case in Europe, in the development of a permanent class of men trained to forest work. Under present methods this result can never be attained to the same degree. The lumbering in one community is generally so short-lived that there is neither time nor necessity to train up a body of men on the ground to carry out the work. The result is that Maine and Michigan woodsmen are found working in the hardwoods of the Southern Appalachians; loggers from



The Stump of a Giant Sequoia

From the American Museum of Natural History

Wisconsin and Minnesota are helping to cut the redwood on the Pacific coast, and in each of the great timber regions there is a mingling of lumbermen from several of the others. The effect has been to develop, by constant labor at their trade under widely varying conditions, a force of men who are unequaled for enterprise and skill in their profession ; but the system has very largely failed in what is of infinitely greater importance to the permanent welfare of the lumber industry—the upbuilding throughout the country of a stable class of workers in the woods, locally trained and carrying on their work each in his own community. The advantages of such a condition lie in an equitable geographical distribution of labor, in the wholesome influence throughout the country of a class whose means of livelihood is forest work, and in the fact that all the operations of lumbering may in this way be conducted more cheaply than in any other.

The effect upon the prices of lumber which will result from the application of forestry to the lumber industry will be strongly marked. The wide fluctuation characteristic of lumber values today is much more the result of conditions within the industry itself than of variations in the demand for the product of the forest. The uncertainty of available supplies, the lack of true proportion between stumpage values and lumber values, the speculative features which the industry now presents, have all tended to produce an exceedingly unstable and abnormal fluctuation in the prices of lumber, with a marked disposition toward rapid increase. Under forestry the speculative element can not exist. The cost of producing timber, plus a legitimate profit, will be the basis upon which the value of it will be fixed. The annual output of the country will be no longer a matter of conjecture, and a steady and normal range of prices for lumber will be the inevitable result.

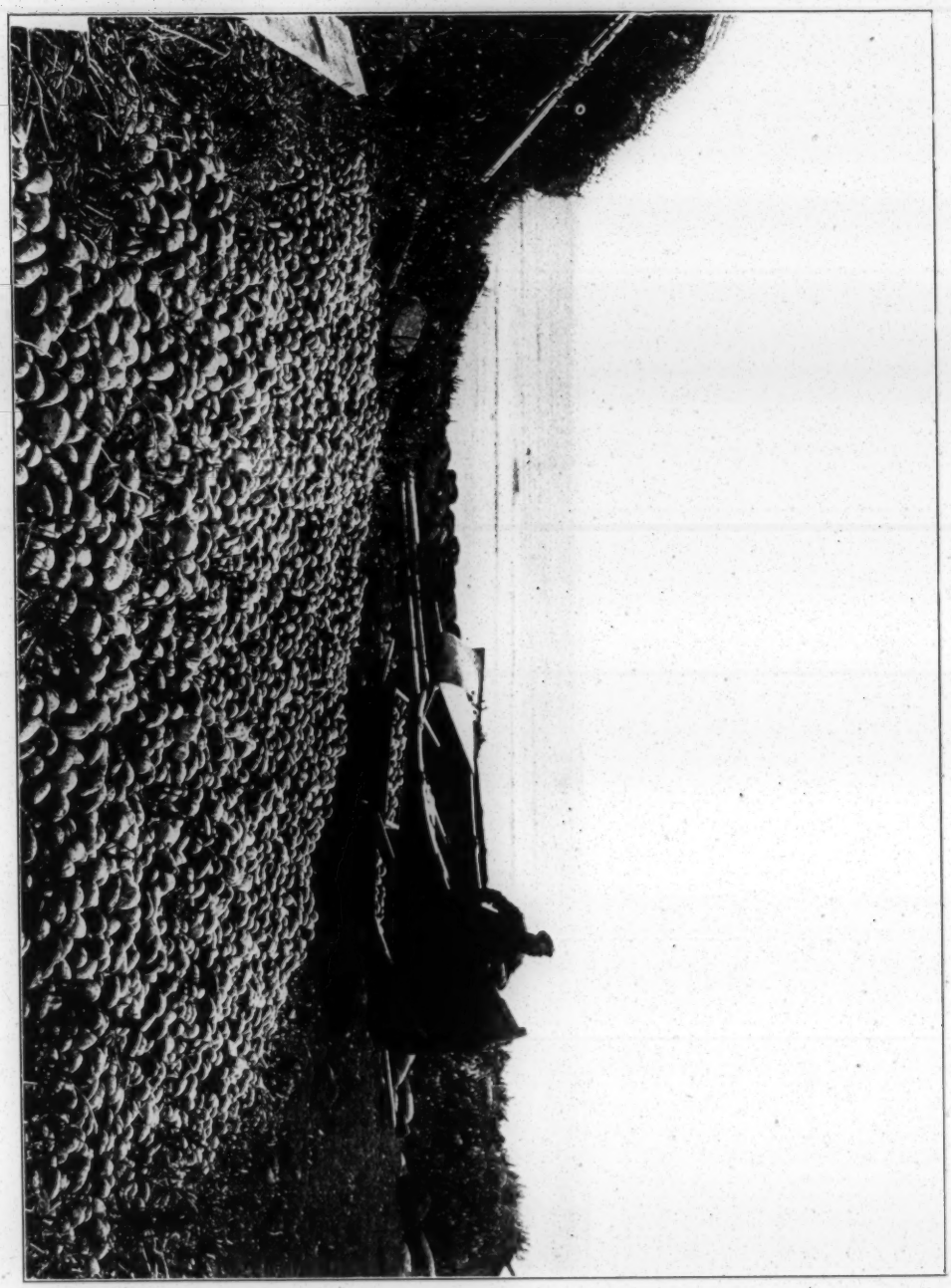
The influence of forestry upon the lumber industry is not a matter of conjecture. The details will have to work themselves out, but the broad results of conservative forest policy on the part of private owners are plain. The lumber industry in the United States is approaching a crisis. There is no more doubt that conservative methods will be applied to lumbering in this country than there is of the development of irrigation, of regulation of grazing, of the application of improved methods in agriculture, or of any other modification to which private as well as public interests point the way. How long it will be before the results of practical forestry make themselves generally felt it is impossible to foretell ; but the fact remains that there will be established in this as in other countries in which conservative lumbering has followed wasteful lumbering a legitimate and permanent industry, characterized, as has been stated, by conditions under which speculation can not exist. Prices will continue normal and steady, and the quantity of timber produced will be the main factor in regulating consumption.

GEOGRAPHIC NOTES

GUILLEMOT EGGS

THROUGH the courtesy of Mr Joseph Stanley-Brown, formerly Secretary of the National Geographic Society, the NATIONAL GEOGRAPHIC MAGAZINE is able to publish the remarkable illustration of guillemot eggs shown on page 387. The photograph was taken by Mr H. D. Chichester at the boat landing on St Paul Island, Pribilof group, and is a result of one of the an-

Guillemot Eggs—St Paul Island, Pribilof Group



Guillemot Eggs—St Paul Island, Pribiloff Group

nual trips of the Aleuts, who live on St Paul, to the barren rock called Walrus Island, which lies a little to the eastward of the extreme northern point of St Paul. In the spring, when the guillemots ("arries," they are called by the natives) and gulls begin to lay eggs on this isolated, and hence protected, rock, the natives go there in their boats and sweep clean a large area. Returning two weeks later they find a vast number of eggs which have not been set upon sufficiently to be spoiled. The photograph represents the results of such an expedition to Walrus Island. The egg of the guillemot is somewhat larger than a hen's egg, and the contents make an excellent article of food, not quite so palatable to the white man's taste as the hen's egg, but still a most excellent substitute for it in the land where hen's eggs are few and far between.

SKULL OF THE IMPERIAL MAMMOTH

THERE has just been placed on exhibition in the Fossil Mammal Hall of the American Museum of Natural History a superb specimen of the tusks and palate of what may be known as the "imperial mammoth," described in 1858 by Joseph Leidy as *Elephas imperator*, from a single tooth found in Indiana.

The specimen was discovered in the sands of western Texas many years ago by an amateur collector, and was only recently secured by the American Museum. The upper portions of the skull have been reproduced in plaster, but the entire lower portion of the skull, the large pair of grinding teeth, and the gigantic tusks are complete. The latter fall little short of being the largest elephant tusks thus far described among either living or fossil members of this family. So far as preserved they measure 13 feet 6 inches from the base of the tusks to the tips, and there is at least a foot broken away from the end of the tip, making the total estimated length 14 feet 6 inches.

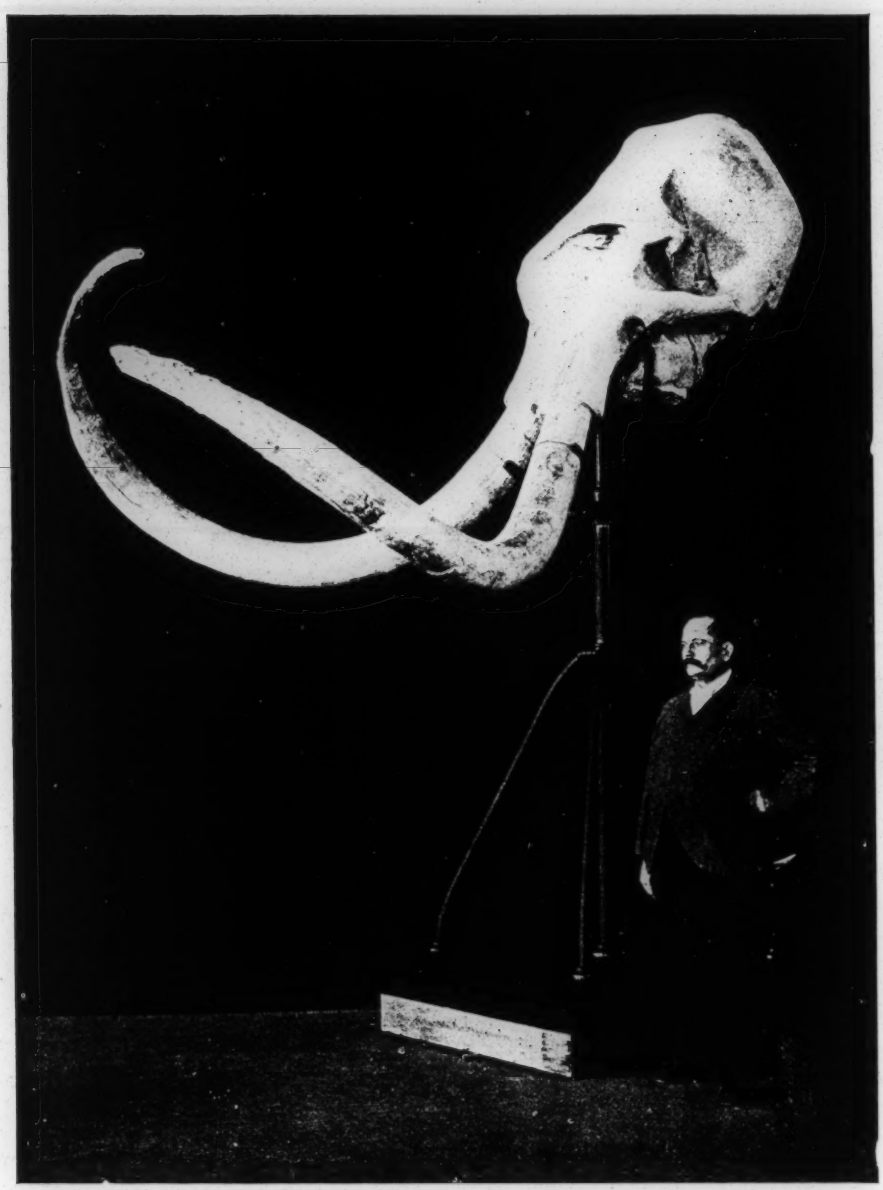
On leaving the skull, the tusks (which were undoubtedly used for fighting purposes) in young and middle-aged animals curve downward and outward; then, in old animals, upward and inward until the tips almost meet each other. The height of this animal must have been at least 13 feet, 2 feet higher than that of the famous African elephant "Jumbo," the skeleton of which is also in the Museum.

The single molar or grinding tooth is distinguished from that of the mammoth of the extreme north (*Elephas primigenius*) and that of the Columbian mammoth of the middle United States (*Elephas columbi*) by its very large size and by the comparatively small number of its enamel plates, which are set widely apart and surrounded by broad bands of cement. In the grinders of the northern mammoth the enamel plates are extremely numerous and closely appressed and there is little or no cement.

This specimen of the imperial mammoth, therefore, adds greatly to our knowledge, and, together with the giant fore limb, which is placed on exhibition near by, gives an impressive idea of the enormous size attained by the early Pleistocene or preglacial elephants in this country.

EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS

PURSUANT to the action of the Seventh International Geographic Congress held in Berlin in 1899, the geographers and geographic societies of the United States are considering plans for the ensuing congress, which is to convene in September, 1904. It is proposed to have the principal scientific sessions in Washington early in the month, and to have social sessions in New York, Philadelphia, Baltimore, and Chicago, with a final session in conjunc-



From the American Museum of Natural History

Skull and Tusks of the Imperial Mammoth Discovered in the Sands of Western Texas

tion with the World's Congress of Science and Arts in St. Louis. It is provisionally planned also to provide an excursion from St. Louis to Mexico, and thence to points of geographic interest in western United States and Canada.

A preliminary announcement is in press and will shortly be issued to officers and members of geographic societies in all countries, and to geographers who may express interest in the Congress and its work. Details have been entrusted to a committee of arrangements made up of representatives from geographic societies in all parts of the United States. The officers of the committee are: Dr W J McGee (Vice-President National Geographic Society), chairman; Mr John Joy Edson (President Washington Loan and Trust Company), treasurer, and Dr J. H. McCormick, secretary. The office of the committee is in Hubbard Memorial Hall, Washington, D. C., U. S. A., where communications may be addressed.

PHILIPPINE CENSUS

THE field work of the Philippine census has been practically completed. All that remains to be done is the tabulation, compilation, and publication of the returns, a very small matter compared to the difficulty of obtaining the information.

A rough count shows that the total population of the islands is 6,976,574, of which number about 650,000 are included in what are termed wild tribes.

The civilized population, by provinces, is stated as follows: Abra, 37,928; Albay, 235,798; Ambos Camarines, 233,183; Antique, 133,674; Bataan, 43,606; Batangas, 258,802; Benguet, 917; Bohol, 268,397; Bulacan, 220,289; Cagayan, 143,438; Capiz, 224,581; Cavite, 134,438; Cebu, 651,621; Ilocos Norte, 167,717; Ilocos Sur, 171,619; Iloilo, 399,236; Isabela, 69,076; Laguna, 147,660; La Union, 127,966; Lepanto Bontoc, 2,413; Layte, 389,911; Manila, 319,941; Marinduque, 51,801; Masbate, 44,045; Mindoro, 31,331; Misamis, 138,329; Negros Occidental, 309,950; Negros Oriental, 186,397; Nueva, Ecija, 132,271; Pampanga, 218,766; Pangasinan, 397,443; Paragua, 27,481; Rizal, 123,422; Romblon, 52,858; Samar, 265,509; Sorsogon, 120,123; Surigao, 98,714; Tarlac, 135,397; Tayabas, 149,289, and Zambales, 100,953.

Some difficulty was experienced by the census enumerators in the provinces of Bulacan, Rizal, Laguna, Batangas, and Albay, due to roving bands of ladrones, and in four instances the enumerators were held up; but, with a single exception, the schedules were not molested. In the Island of Camiguin, Misamis, the enumerators met with armed opposition, but probably the census was a pretext and not the real cause of the hostile demonstration.

The census was most successful in every respect, and reflects great credit on the American administration and especially on the gentlemen in charge of the work, General Sanger, Mr Henry Gannett, and Mr V. H. Olmsted.

CORRECTION

IN a letter to the NATIONAL GEOGRAPHIC MAGAZINE heartily approving the suggestion of a comprehensive exploration of the volcanic belt of Central America, a suggestion that was made in this Magazine in July, 1903, Hon. Antonio Lazo Arriaga, Envoy Extraordinary and Minister Plenipotentiary of Guatemala, states that the reports of loss of life and property by volcanic disturbances in Guatemala during 1902 and 1903 have been vastly exaggerated. Mr Arriaga refers particularly to the effects of the earthquake at Quezaltenango April 18, 1902, and of the eruption of Santa Maria in November of the same year.

"On each of those occasions and under the excitement of the first moment news was sent abroad telling of 'fearful destruction of life' and of 'thousands of lives destroyed.' When the facts were investigated it was found that a few persons, most of them Indians, who were not numbered by hundreds, and even less by thousands, had lost their lives. It was indeed very unfortunate, but we all felt less depressed when we found that the first published news was exaggerated out of all proportion with the real loss of life. The same was the case with the loss of property, estimated at a great many millions of dollars by the first news, and reduced later on to the real ones—that is, the loss of a part, not the largest, of the latest coffee crop, and some damage caused to the cities and towns. Since then almost all the coffee plantations of the affected zone have recuperated, thanks to the fertility of the lands and to the washing of the sand by the heavy rains which followed the eruptions."

Nearly one million immigrants, 921,315, were adopted by the United States during the twelve months ending June 30, 1903. This was 275,000 more than during 1902 and 130,000 more than during the banner year of 1882.

Of this total nearly one-half came from Italy and Austria-Hungary, Italy sending 230,622 and Austria 206,011, which were respectively 52,247 and 34,022 more than for the preceding twelve months. Russia came third with 136,093, Sweden fourth with 46,028, Germany fifth with 40,086, and Ireland sixth with 35,310. Japan sent 19,958, China 2,209, and the West Indies 8,170.

In addition to those admitted, 8,769 would-be immigrants were denied admission, and 547 more were returned to countries whence they came within one year after landing. The grounds for disbarment were: Pauperism, 5,812 cases; disease, 1,773; contract laborers, 1,086; convicts, 51; insane and idiots, 24; women for immoral purposes, 13; aided paupers, 9, and polygamy, 1. Of the total number admitted, 631,885 landed at the port of New York, 62,838 at Boston, 55,802 at Baltimore, and 32,943 by the northern border.

The United States Geological Survey has just issued a list, complete up to June, 1903, of its serial publications, consisting of annual reports, monographs, professional papers, bulletins, mineral resources, water-supply and irrigation papers, topographic atlas of the United States, and geologic atlas of the United States. Monographs, topographic sheets, and geologic folios are sold at cost of publication—topographic sheets (of which indexes, free on application, are published from time to time) are sold at 5 cents each, or $2 per 100 in one order; geologic folios usually at 25 cents each; the other publications are distributed free.

A North Polar Expedition, a cablegram from England announces, is being organized by Captain Drake, who proposes to build a vessel of barkentine rig, with auxiliary steam power. She will be of 380 tons and will be provisioned for six years. With a crew of twenty, Captain Drake will leave London in December, 1904, for Vladivostock, and go thence to Point Barrow, Alaska, which he expects to reach in July, 1905. Thence he will proceed easterly to Prince Patrick Land, where the winter of 1905–1906 will be passed. In 1906 he will endeavor to push his ship as far north as 86°, and then make his dash for the Pole.

A cablegram from South America announces the successful ascent of Mt Sorata, 21,500 feet, by Miss Annie S. Peck.

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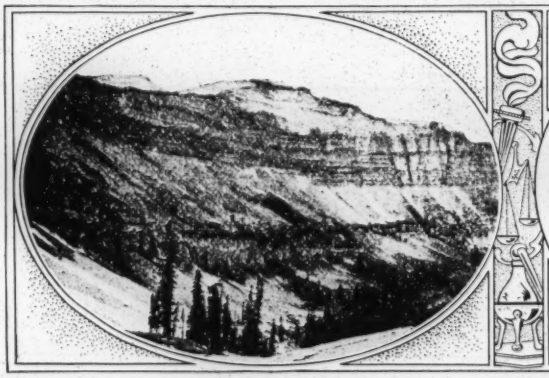

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